

## Lithographic Newspaper Printing Press

This is a continuation of U.S. Patent Application Serial No. 08/844,350, filed April 18, 1997.

5      Field of the Invention

The present invention relates to a lithographic newspaper printing press for printing four pages across the first and the second side of a running web at every revolution.

10     Background Information

Lithographic newspaper printing presses for printing four single or multiple colored newspaper pages across the first and the second side of a running web (16-page presses) are generally known in the art and are used for printing single or multicolored daily or free newspapers.

From the applicant's Galaxy-series presses, it is known to employ blanket-to-blanket printing units having plate cylinders, each carrying two printing plates around and four printing plates across (8 x 2-design), whereby each printing plate carries the image of a corresponding newspaper page to be printed.

Owing to the double-size blanket cylinders and the corresponding double-size plate cylinders carrying two printing plates around the circumference of each cylinder, such 8 x 2-design presses usually comprise a high weight and are comparatively large in size and, therefore, require an expensive reinforced bottom plate or foundation for supporting the printing units and an enlarged pressroom space.

Furthermore, the paging flexibility of 8 x 2-design presses is generally comparatively low, and the page-break - the number of pages that have to be printed without producing a blank page in the printed product - of such presses usually amounts to four pages.

US 3,335,663 purports to disclose a plate lock-up mechanism mounted to a single-size plate cylinder, on which altogether four conventional printing plates are mounted across the width of the cylinder. Although in the document it is mentioned, that the disclosed cylinder is a reversible cylinder which can be used in a newspaper printing press, it does neither describe nor show any details about a printing press.

10

US 3,230,879 describes a plate lock-up mechanism for a double-size plate cylinder carrying four stereotype printing plates across and two of those plates around the circumference. The document gives no information about the kind of printing presses the cylinder can be used for.

### **Summary of the Invention**

Having outlined the state of the art and its attendant disadvantages, it is an object of the present invention to provide a high-performance 8-page newspaper printing press for printing four newspaper pages across, which is small in size, light in weight and easily accessible, which can be operated with a small number of staff and which allows an easy and quick change of printing plates and printing blankets.

It is another object of the present invention, to provide a newspaper printing press in which the width of the unprinted margin of each printed newspaper page is reduced to only a fraction of the width of the minimum margin achievable with conventional prior art newspaper presses.

25 first and a second plate cylinder, each being rotatably mounted in said housing, said plate cylinders having a length being substantially four times the width of a newspaper page and having a circumference being substantially equal to the height of a newspaper page; a first and a second blanket cylinder associated with said first and second plate cylinders, each of said first and second blanket cylinders having substantially the same diameter as the associated plate

cylinder, an axially removable continuous blanket sleeve mounted on each of said first and second blanket cylinders, whereby each of said first and second blanket cylinders are cantilevered in said first side wall of said housing, when said continuous blanket sleeves are removed from said first and second blanket cylinders.

5

According to a further embodiment of the present invention, the first and second plate cylinders and the associated blanket cylinders of each printing unit are arranged substantially in line.

Pursuant to another embodiment of the invention, each couple formed of a plate cylinder and its

10 associated blanket cylinder in a printing unit is driven by a separate motor.

According to a preferred embodiment of the invention, each of the first and second plate cylinders is carrying four conventional flat printing plates which are wrapped around and held on the plate cylinders by a plate lock-up mechanism, whereby the printing plates are arranged on the plate cylinder side by side.

In an alternative embodiment, each of the first and second plate cylinders can carry four axially removable continuous printing plates, whereby the first and second plate cylinders are cantilevered in one sidewall of said housing, when the continuous printing plates are axially removed from the plate cylinder through a respective aperture formed in the other side wall of the housing. In this embodiment of the present invention, the continuous axially removable printing plates are preferably arranged on the respective plate cylinder side by side.

25 Alternatively, the conventional flat plates or the axially removable continuous plates can be arranged on the associated plate cylinder in predetermined distances from each other.

According to the preferred embodiment of the invention, the length of said first and second plate cylinders is in the range between 1200 mm and 1700 mm, and the circumference of each of said first and second plate cylinders is in the range between 470 mm and 650 mm. The length to

diameter ratio of said first and second plate cylinders is preferably in the range between 8.4:1 and 9:1.

According to an exemplary embodiment of the invention, four printing units, each printing unit printing a different color, are preferably arranged on top of each other, whereby the web is running substantially vertically from one unit to the other. Additionally, there can be a fifth printing unit arranged on top of the four printing units. In this embodiment, the four printing units are preferably for printing the colors yellow, magenta, cyan and black, and said fifth printing unit is used as an imprinting unit for printing spot-colors which are different from said colors of said four printing units.

Alternatively, the fifth printing unit is printing the same color as one of said four printing units and is operated in alternation with said printing unit printing the same color, so that the respective printing unit currently not in operation can be equipped with new blankets or with printing plates for the next print job, while the other printing units are in operation.

The printing press according to the present invention is eventually preferably used, together with a known pinless folding apparatus for processing the printed web into signatures, in order to minimize the margin of each signature and therewith the amount of paper needed for a specific print job.

The printing press according to the present invention has a number of advantages which will be described herein below.

Firstly, owing to the small diameter of the plate cylinder, the number of printing plates needed for each print job is only half the number needed for known 16-page-presses carrying two identical printing plates around the circumference and four printing plates across the width of the web. Thus, the costs and space needed for producing and storing the printing plates is tremendously reduced. Furthermore, in a newspaper printing press according to the present

invention, the number of page-breaks or page-jumps is reduced to two, so that the flexibility of paging is increased, as compared to 8-presses in which the number of page-breaks usually amounts to four. Accordingly, with a newspaper printing press according to the present invention, there is a much higher flexibility in arranging the set-up of each newspaper page,  
5 leading to a reduction of time and costs involved in pre-press. Besides, the amount of spoilage produced when a printing plate is wrongly mounted on the plate cylinder is also reduced, as compared to conventional 4 x 2-newspaper presses.

Secondly, the downtime of the press caused by the printed web wrapping around the blanket  
10 cylinder in case of a web break or a broken blanket is significantly reduced, since the continuous printing blanket with the web wrapped around can easily be axially removed through an aperture in the side wall and be replaced by a new blanket. Thus, there is no downtime needed for removing the compressed and hardened layer of web and ink from the blanket cylinder, as it is usually needed when using conventional printing blankets.

Furthermore, owing to the low height of the printing units and the tower arrangements comprised of four or five printing units disposed on top of each other, the so-called "fan out" of the web is comparatively small. Accordingly, the quality of the printed products is significantly improved. Besides, the reduced height of such tower arrangements requires only one gallery for a five-unit tower arrangement, leading to an increase of working ergonomics and a reduction of material costs. For example, the make-ready operations for setting up the fifth printing unit of a five-unit tower arrangement, when running said fifth unit in alternation with one of the other four units of said tower arrangement, can easily be performed by one person standing on said gallery, without using a ladder or any other kind of objects to stand on. Thus, the operation of a press according  
25 to the present invention having a five-unit tower arrangement does not require additional safety precautions for preventing a pressman from falling down when setting up the upper printing unit.

## Brief Description of the Drawings

The present invention, together with additional objects and advantages thereof, will be best understood from the following description of specific exemplary embodiments, when read in connection with the accompanying drawings, in which:

Fig. 1 is a schematic side view of a preferred embodiment of a newspaper printing press according to the present invention, having two four-unit tower arrangements on either side of a folding apparatus;

10

Fig. 2 is a schematic side view of a five-unit tower arrangement of another embodiment of a printing press according to the present invention;

15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95

Fig. 3 is a schematic front view of the five-unit tower arrangement of Fig. 2;

Fig. 4 is a schematic top view of a printing unit of a lithographic newspaper printing press according to the present invention; and

Fig. 5 shows a further embodiment of the present invention, in which the printing plates are formed as continuous sleeve-shaped printing plates mounted on a cantilevered plate cylinder side by side.

## Detailed Description of the Invention

25 A lithographic newspaper printing press 1 according to the present invention, which is schematically shown in Fig. 1, comprises a plurality of printing-unit tower arrangements 2a, 2b, 2c and 2d, each consisting of a plurality of printing units 4, e.g. four printing units 4, each printing one of the colors yellow, magenta, cyan and black on a first and a second side of a respective web 6 preferably running vertically through each of the units 4. The printing press 1

according to the present invention further comprises a folding apparatus 8, to which the plurality of webs 6 is supplied. The folding apparatus 8 is preferably located in the middle of the printing press 1 and provides a plurality of not shown cut and folded newspaper pages from the plurality of webs 6 for further processing.

5

The present invention is not limited to the arrangement of towers 2, the number of printing units 4 arranged in each tower and the location of the folding apparatus 8 shown in Fig. 1. For example, it is also possible to arrange a further fifth printing unit 4 on top of one, two or more of the towers 2 and to place the folding apparatus 8 at the end of a row of towers 2.

10

A schematic cross-sectional view of a preferred tower arrangement 2 with altogether five printing units 4.1, 4.2, 4.3, 4.4 and 4.5 mounted on top of each other is shown in detail in Fig. 2. Each printing unit 4 comprises a first and a second blanket cylinder 10a, 10b, on which a respective first and second continuous, sleeve-shaped printing blanket 12a, 12b is mounted. As shown in detail in Fig. 3, the continuous printing blankets 12a, 12b are mounted on the blanket cylinders 10a, 10b such, that they are axially removable from the first and second blanket cylinders 10a, 10b through respective apertures 14 formed in one first side wall 16 of the housing 18 of the printing press 1. When removing the first and/or the second blanket sleeve 12a, 12b through respective apertures 14, the first and/or second blanket cylinders 10a, 10b are cantilevered in a second side wall 20 of the housing 18, as it is e.g. indicated in Fig. 3. During the operation of the printing press, the first and second blanket cylinders 10a, 10b are preferably rotatably supported in both side walls 16 and 20 of the housing 18, as it is shown in Fig. 4. Therefore, a respective bearing 22 is mounted in the aperture 14 associated with each of the blanket cylinders 10a, 10b, as it is indicated in Fig. 4. A detailed description of the mounting of continuous sleeve-shaped printing blankets on cantilevered blanket cylinders is e.g. described in detail in US 5,429,048, which is hereby incorporated by reference.

25  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113  
114  
115  
116  
117  
118  
119  
120  
121  
122  
123  
124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180  
181  
182  
183  
184  
185  
186  
187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247  
248  
249  
250  
251  
252  
253  
254  
255  
256  
257  
258  
259  
2510  
2511  
2512  
2513  
2514  
2515  
2516  
2517  
2518  
2519  
2520  
2521  
2522  
2523  
2524  
2525  
2526  
2527  
2528  
2529  
2530  
2531  
2532  
2533  
2534  
2535  
2536  
2537  
2538  
2539  
2540  
2541  
2542  
2543  
2544  
2545  
2546  
2547  
2548  
2549  
2550  
2551  
2552  
2553  
2554  
2555  
2556  
2557  
2558  
2559  
2560  
2561  
2562  
2563  
2564  
2565  
2566  
2567  
2568  
2569  
2570  
2571  
2572  
2573  
2574  
2575  
2576  
2577  
2578  
2579  
2580  
2581  
2582  
2583  
2584  
2585  
2586  
2587  
2588  
2589  
2590  
2591  
2592  
2593  
2594  
2595  
2596  
2597  
2598  
2599  
25100  
25101  
25102  
25103  
25104  
25105  
25106  
25107  
25108  
25109  
25110  
25111  
25112  
25113  
25114  
25115  
25116  
25117  
25118  
25119  
25120  
25121  
25122  
25123  
25124  
25125  
25126  
25127  
25128  
25129  
25130  
25131  
25132  
25133  
25134  
25135  
25136  
25137  
25138  
25139  
25140  
25141  
25142  
25143  
25144  
25145  
25146  
25147  
25148  
25149  
25150  
25151  
25152  
25153  
25154  
25155  
25156  
25157  
25158  
25159  
25160  
25161  
25162  
25163  
25164  
25165  
25166  
25167  
25168  
25169  
25170  
25171  
25172  
25173  
25174  
25175  
25176  
25177  
25178  
25179  
25180  
25181  
25182  
25183  
25184  
25185  
25186  
25187  
25188  
25189  
25190  
25191  
25192  
25193  
25194  
25195  
25196  
25197  
25198  
25199  
25200  
25201  
25202  
25203  
25204  
25205  
25206  
25207  
25208  
25209  
25210  
25211  
25212  
25213  
25214  
25215  
25216  
25217  
25218  
25219  
25220  
25221  
25222  
25223  
25224  
25225  
25226  
25227  
25228  
25229  
25230  
25231  
25232  
25233  
25234  
25235  
25236  
25237  
25238  
25239  
25240  
25241  
25242  
25243  
25244  
25245  
25246  
25247  
25248  
25249  
25250  
25251  
25252  
25253  
25254  
25255  
25256  
25257  
25258  
25259  
25260  
25261  
25262  
25263  
25264  
25265  
25266  
25267  
25268  
25269  
25270  
25271  
25272  
25273  
25274  
25275  
25276  
25277  
25278  
25279  
25280  
25281  
25282  
25283  
25284  
25285  
25286  
25287  
25288  
25289  
25290  
25291  
25292  
25293  
25294  
25295  
25296  
25297  
25298  
25299  
25300  
25301  
25302  
25303  
25304  
25305  
25306  
25307  
25308  
25309  
25310  
25311  
25312  
25313  
25314  
25315  
25316  
25317  
25318  
25319  
25320  
25321  
25322  
25323  
25324  
25325  
25326  
25327  
25328  
25329  
25330  
25331  
25332  
25333  
25334  
25335  
25336  
25337  
25338  
25339  
25340  
25341  
25342  
25343  
25344  
25345  
25346  
25347  
25348  
25349  
25350  
25351  
25352  
25353  
25354  
25355  
25356  
25357  
25358  
25359  
25360  
25361  
25362  
25363  
25364  
25365  
25366  
25367  
25368  
25369  
25370  
25371  
25372  
25373  
25374  
25375  
25376  
25377  
25378  
25379  
25380  
25381  
25382  
25383  
25384  
25385  
25386  
25387  
25388  
25389  
25390  
25391  
25392  
25393  
25394  
25395  
25396  
25397  
25398  
25399  
25400  
25401  
25402  
25403  
25404  
25405  
25406  
25407  
25408  
25409  
25410  
25411  
25412  
25413  
25414  
25415  
25416  
25417  
25418  
25419  
25420  
25421  
25422  
25423  
25424  
25425  
25426  
25427  
25428  
25429  
25430  
25431  
25432  
25433  
25434  
25435  
25436  
25437  
25438  
25439  
25440  
25441  
25442  
25443  
25444  
25445  
25446  
25447  
25448  
25449  
25450  
25451  
25452  
25453  
25454  
25455  
25456  
25457  
25458  
25459  
25460  
25461  
25462  
25463  
25464  
25465  
25466  
25467  
25468  
25469  
25470  
25471  
25472  
25473  
25474  
25475  
25476  
25477  
25478  
25479  
25480  
25481  
25482  
25483  
25484  
25485  
25486  
25487  
25488  
25489  
25490  
25491  
25492  
25493  
25494  
25495  
25496  
25497  
25498  
25499  
25500  
25501  
25502  
25503  
25504  
25505  
25506  
25507  
25508  
25509  
25510  
25511  
25512  
25513  
25514  
25515  
25516  
25517  
25518  
25519  
25520  
25521  
25522  
25523  
25524  
25525  
25526  
25527  
25528  
25529  
25530  
25531  
25532  
25533  
25534  
25535  
25536  
25537  
25538  
25539  
25540  
25541  
25542  
25543  
25544  
25545  
25546  
25547  
25548  
25549  
25550  
25551  
25552  
25553  
25554  
25555  
25556  
25557  
25558  
25559  
25560  
25561  
25562  
25563  
25564  
25565  
25566  
25567  
25568  
25569  
25570  
25571  
25572  
25573  
25574  
25575  
25576  
25577  
25578  
25579  
25580  
25581  
25582  
25583  
25584  
25585  
25586  
25587  
25588  
25589  
25590  
25591  
25592  
25593  
25594  
25595  
25596  
25597  
25598  
25599  
25600  
25601  
25602  
25603  
25604  
25605  
25606  
25607  
25608  
25609  
25610  
25611  
25612  
25613  
25614  
25615  
25616  
25617  
25618  
25619  
25620  
25621  
25622  
25623  
25624  
25625  
25626  
25627  
25628  
25629  
25630  
25631  
25632  
25633  
25634  
25635  
25636  
25637  
25638  
25639  
25640  
25641  
25642  
25643  
25644  
25645  
25646  
25647  
25648  
25649  
25650  
25651  
25652  
25653  
25654  
25655  
25656  
25657  
25658  
25659  
25660  
25661  
25662  
25663  
25664  
25665  
25666  
25667  
25668  
25669  
25670  
25671  
25672  
25673  
25674  
25675  
25676  
25677  
25678  
25679  
25680  
25681  
25682  
25683  
25684  
25685  
25686  
25687  
25688  
25689  
25690  
25691  
25692  
25693  
25694  
25695  
25696  
25697  
25698  
25699  
25700  
25701  
25702  
25703  
25704  
25705  
25706  
25707  
25708  
25709  
25710  
25711  
25712  
25713  
25714  
25715  
25716  
25717  
25718  
25719  
25720  
25721  
25722  
25723  
25724  
25725  
25726  
25727  
25728  
25729  
25730  
25731  
25732  
25733  
25734  
25735  
25736  
25737  
25738  
25739  
25740  
25741  
25742  
25743  
25744  
25745  
25746  
25747  
25748  
25749  
25750  
25751  
25752  
25753  
25754  
25755  
25756  
25757  
25758  
25759  
25760  
25761  
25762  
25763  
25764  
25765  
25766  
25767  
25768  
25769  
25770  
25771  
25772  
25773  
25774  
25775  
25776  
25777  
25778  
25779  
25780  
25781  
25782  
25783  
25784  
25785  
25786  
25787  
25788  
25789  
25790  
25791  
25792  
25793  
25794  
25795  
25796  
25797  
25798  
25799  
25800  
25801  
25802  
25803  
25804  
25805  
25806  
25807  
25808  
25809  
25810  
25811  
25812  
25813  
25814  
25815  
25816  
25817  
25818  
25819  
25820  
25821  
25822  
25823  
25824  
25825  
25826  
25827  
25828  
25829  
25830  
25831  
25832  
25833  
25834  
25835  
25836  
25837  
25838  
25839  
25840  
25841  
25842  
25843  
25844  
25845  
25846  
25847  
25848  
25849  
25850  
25851  
25852  
25853  
25854  
25855  
25856  
25857  
25858  
25859  
25860  
25861  
25862  
25863  
25864  
25865  
25866  
25867  
25868  
25869  
25870  
25871  
25872  
25873  
25874  
25875  
25876  
25877  
25878  
25879  
25880  
25881  
25882  
25883  
25884  
25885  
25886  
25887  
25888  
25889  
25890  
25891  
25892  
25893  
25894  
25895  
25896  
25897  
25898  
25899  
25900  
25901  
25902  
25903  
25904  
25905  
25906  
25907  
25908  
25909  
25910  
25911  
25912  
25913  
25914  
25915  
25916  
25917  
25918  
25919  
25920  
25921  
25922  
25923  
25924  
25925  
25926  
25927  
25928  
25929  
25930  
25931  
25932  
25933  
25934  
25935  
25936  
25937  
25938  
25939  
25940  
25941  
25942  
25943  
25944  
25945  
25946  
25947  
25948  
25949  
25950  
25951  
25952  
25953  
25954  
25955  
25956  
25957  
25958  
25959  
25960  
25961  
25962  
25963  
25964  
25965  
25966  
25967  
25968  
25969  
25970  
25971  
25972  
25973  
25974  
25975  
25976  
25977  
25978  
25979  
25980  
25981  
25982  
25983  
25984  
25985  
25986  
25987  
25988  
25989  
25990  
25991  
25992  
25993  
25994  
25995  
25996  
25997  
25998  
25999  
25100  
25101  
25102  
25103  
25104  
25105  
25106  
25107  
25108  
25109  
25110  
25111  
25112  
25113  
25114  
25115  
25116  
25117  
25118  
25119  
25120  
25121  
25122  
25123  
25124  
25125  
25126  
25127  
25128  
25129  
25130  
25131  
25132  
25133  
25134  
25135  
25136  
25137  
25138  
25139  
25140  
25141  
25142  
25143  
25144  
25145  
25146  
25147  
25148  
25149  
25150  
25151  
25152  
25153  
25154  
25155  
25156  
25157  
25158  
25159  
25160  
25161  
25162  
25163  
25164  
25165  
25166  
25167  
25168  
25169  
25170  
25171  
25172  
25173  
25174  
25175  
25176  
25177  
25178  
25179  
25180  
25181  
25182  
25183  
25184  
25185  
25186  
25187  
25188  
25189  
25190  
25191  
25192  
25193  
25194  
25195  
25196  
25197  
25198  
25199  
25200  
25201  
25202  
25203  
25204  
25205  
25206  
25207  
25208  
25209  
25210  
25211  
25212  
25213  
25214  
25215  
25216  
25217  
25218  
25219  
25220  
25221  
25222  
25223  
25224  
25225  
25226  
25227  
25228  
25229  
25230  
25231  
25232  
25233  
25234  
25235  
25236  
25237  
25238  
25239  
25240  
25241  
25242  
25243  
25244  
25245  
25246  
25247  
25248  
25249  
25250  
25251  
25252  
25253  
25254  
25255  
25256  
25257  
25258  
25259  
25260  
25261  
25262  
25263  
25264  
25265  
25266  
25267  
25268  
25269  
25270  
25271  
25272  
25273  
25274  
25275  
25276  
25277  
25278  
25279  
25280  
25281  
25282  
25283  
25284  
25285  
25286  
25287  
25288  
25289  
25290  
25291  
25292  
25293  
25294  
25295  
25296  
25297  
25298  
25299  
25300  
25301  
25302  
25303  
25304  
25305  
25306  
25307  
25308  
25309  
25310  
25311  
25312  
25313  
25314  
25315  
25316  
25317  
25318  
25319  
25320  
25321  
25322  
25323  
25324  
25325  
25326  
25327  
25328  
25329  
25330  
25331  
25332  
25333  
25334  
25335  
25336  
25337  
25338  
25339  
25340  
25341  
25342  
25343  
25344  
25345  
25346  
25347  
25348  
25349  
25350  
25351  
25352  
25353  
25354  
25355  
25356  
25357  
25358  
25359  
25360  
25361  
25362  
25363  
25364  
25365  
25366  
25367  
25368  
25369  
25370  
25371  
25372  
25373  
25374  
25375  
25376  
25377  
25378  
25379  
25380  
25381  
25382  
25383  
25384  
25385  
25386  
25387  
25388  
25389  
25390  
25391  
25392  
25393  
25394  
25395  
25396  
25397  
25398  
25399  
25400  
25401  
25402  
25403  
25404  
25405  
25406  
25407  
25408  
25409  
25410  
25411  
25412  
25413  
25414  
25415  
25416  
25417  
25418  
25419  
25420  
25421  
25422  
25423  
25424  
25425  
25426  
25427  
25428  
25429  
25430  
25431  
25432  
25433  
25434  
25435  
25436  
25437  
25438  
25439  
25440  
25441  
25442  
25443  
25444  
25445  
25446  
25447  
25448  
25449  
25450  
25451  
25452  
25453  
25454  
25455  
25456  
25457  
25458  
25459  
25460  
25461  
25462  
25463  
25464  
25465  
25466  
25467  
25468  
25469  
25470  
25471  
25472  
25473  
25474  
25475  
25476  
25477<br

24b has substantially the same diameter as its associated blanket cylinder 10a, 10b and carries a set of four printing plates A, B, C, D and E, F, G, H, whereby each printing plate A, B, C, D, E, F, G, H is carrying the image of a respective newspaper page to be printed on the web 6. The printing plates A, B, C, D, E, F, G, H are preferably conventional flexible, flat printing plates which are wrapped around the body of the first and/or second plate cylinder 24a, 24b and which are held on said cylinders 24 by means of a known plate lock-up device 38, which is schematically shown in Fig. 2.

In a preferred embodiment of the invention, each of the first and second plate cylinders 24a, 24b comprises a plate lock-up mechanism 38 for separately locking up each of the four conventional printing plates A, B, C, D, E, F, G, H. A plate lock-up mechanism for separately locking up four different printing plates is e.g. described in US 3,335,663 and US 3,230,879, which are hereby incorporated by reference.

10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95

Alternatively, the printing plates A, B, C, D, E, F, G, H can also be formed as continuous sleeve-shaped printing plates A', B', C', D', E', F', G', H', as e. g. known from US 4,913,048 which is hereby incorporated by reference. In this embodiment of the invention, which is schematically shown in Fig. 5, the first and second plate cylinders 24a, 24b are cantilevered in the respective side wall 20 of the housing 18 when axially removing the continuous plate sleeve A', B', C' and D' through a not shown aperture formed in the opposite side wall of the housing 18 when the printing press is not in operation. During the operation of the printing press 1, the plate cylinders 24a, 24b of this embodiment of the invention are preferably also rotatably supported in both side walls 16, 20 of the housing 18, as it is hereinbefore described for the associated blanket cylinders 10a and 10b.

In the preferred embodiment of the invention, the printing plates A, A', B, B', C, C', D, D' and E, E', F, F', G, G', H, H' are preferably mounted on the respective first and second plate cylinder 24a, 24b such, that there is no gap or space provided between two neighboring printing plates. Alternatively, according to a not shown embodiment of the invention, the conventional flexible,

flat printing plates or the continuous sleeve-shaped printing plates can be mounted on the respective plate cylinders 24a, 24b such, that there is provided a defined distance between the side edges of two neighboring printing plates.

5 As it can be seen from Fig. 1 and Fig. 2, in the preferred embodiment of the invention the first and second plate cylinders 24a, 24b of each printing unit are preferably arranged substantially in line, whereby it can be advantageous, that the cylinders of each printing unit are slightly inclined with respect to the horizontal, in order to increase the wrap of the web 6 around each of the first and second blanket cylinders 10a, 10b of the printing units 4.

10

As it can further be seen from Fig. 2 and Fig. 3, in the preferred embodiment of the invention, each of the printing couples formed of the first and second plate cylinders 24a, 24b and its associated blanket cylinders 12a, 12b is driven by a separate motor 26. In this embodiment the circumferential register adjustment is performed via the separate motors 26. Alternatively, the plate and blanket cylinders 24a, 24b and 10a, 10b can also be driven by a common drive shaft. In order to provide for a circumferential register adjustment of the first and second plate cylinders 24a, 24b, there can be provided a respective circumferential adjustment apparatus 27, e.g. in form of a known harmonic drive coupled to the drive shaft of each of the first and/or second plate cylinder 24a, 24b. The circumferential and, additionally, the lateral register adjustment of each of the plate cylinders 24a, 24b can also be performed by means of a known conventional adjustment apparatus, as it is e. g. described in US 5,535,675 which is hereinafter incorporated by reference.

25 In a preferred embodiment of the invention the first and second plate cylinders 24a, 24b comprise a length which lies in the range between 1200 mm and 1700 mm. In this embodiment of the invention, the circumference of the first and second plate cylinders 24a, 24b and the first and second blanket cylinders 10a, 10b is preferably in the range between 470 mm and 650 mm. In this embodiment of the invention, the length to diameter ratio of said first and second plate cylinders 24a, 24b is accordingly in the range between 8.4:1 and 9:1.

As described hereinbefore and as it is shown, for example, in Fig. 1, there can be four printing units 4 arranged on top of each other, each printing unit printing one of the colors; yellow (Y), magenta (M), cyan (C) and black (B), whereby the web is running substantially vertical from one unit 4 to the other.

5

In an even more preferred embodiment of the invention, there are arranged four printing units 4.1, 4.2, 4.3 and 4.4 for printing the colors yellow (Y), magenta (M), cyan (C) and black (B), together with a fifth printing unit 4.5, on top of each other, as it is shown in Fig. 2. The fifth printing unit 4.5 can either be used for printing an additional pure color (S) which can only be printed in low quality by combining the four colors yellow (Y), magenta (M), cyan (C) and black (B) and which is e. g. used for company logos etc.

Alternatively, the fifth printing unit 4.5 can also be used for printing the same color, preferably black (B), in alternation with one of the lower printing units 4.1 to 4.4 printing the same color. In this mode of operation, the printing unit which is currently not used for a print job is set silent after disengaging the respective plate cylinders 10a, 10b of the unit 4 from the running web 6. The silent printing unit 4 can then be equipped with new printing blankets 12a, 12b or with new printing plates A, A', B, B', C, C', D, D', E, E', F, F', G, G' and H, H' for the next print job.

As it is shown in Fig. 2, there can further be provided a gallery or working platform 28 with a scaffolding 30 and a ladder 32 for entering the platform 28. The platform 28 has preferably a height of about 2.2 m and is located between the printing units 4.2 and 4.3 shown in Fig. 2 such, that the lower printing units 4.1 and 4.2 can be set up by the press operator 34, while standing on the floor 36 of the press room, and the upper three printing units 4.3, 4.4 and 4.5 can be equipped or set up by the press operator 34 while standing on the platform 28. According to the embodiment of the printing unit 4.1 to 4.5 of the tower arrangement 2 shown in Fig. 2, the height of each printing unit 4.1, 4.2 is about 1.1 m and the height of the platform 28 is approximately 2.2 m. Thus, the press operator 34 can easily axially remove the continuous printing blankets 12a, 12b and/or continuous printing plates A', B', C', D' and E', F', G', H' of Fig. 5 of the upper

printing units 4.3 to 4.5 through the respective aperture 14 shown in Fig. 4, while standing on the platform 28.

In the preferred embodiment of the invention using conventional printing plates A, B, C, D and  
5 E', F', G', H' on the respective first and second plate cylinder 24a, 24b, the flat, flexible plates are  
preferably replaced through apertures 40.1, 40.2, 40.3, 40.4, 40.5, as indicated in Fig. 3.

It is understood that the height of each printing unit 4 or the height of the platform 28 can also be  
larger or smaller.

10

TOKYO MARU